

WHAT IS CLAIMED IS:

1. A liquid crystal display panel comprising:

a first substrate including a plurality of pixels and a plurality of sensing parts,
5 each of the sensing parts generating an output signal containing location information
in response to an input signal, the location information indicating a location where
the input signal is inputted;

a second substrate connected to the first substrate, the second substrate
facing the first substrate; and

10 a liquid crystal layer interposed between the first substrate and the second
substrate.

2. The liquid crystal display device of claim 1, wherein the input signal
corresponds to an incident light, the incident light passing through the second
15 substrate to reach the sensing part, and the sensing part outputting an analog signal
in response to the incident light.

3. The liquid crystal display device of claim 2, wherein the incident light
is an infrared light.

20 4. The liquid crystal display device of claim 1, wherein the input signal
corresponds to compression applied to the sensing part, the sensing part outputting
an analog signal in response to the compression.

25 5. A liquid crystal display device comprising:

a liquid crystal display panel including a plurality of pixels and a plurality of sensing parts, each of the sensing parts generating an analog signal containing location information in response to an incident light, the location information indicating a location where the light enters; and

5 a control part receiving the analog signal and transforming the analog signal into a digital signal, the liquid crystal display device being controlled in response to the digital signal.

6. The liquid crystal display device of claim 5, wherein each of the
10 pixels includes a gate line, a data line, a first switching device electrically connected to the gate line and the data line, and a pixel electrode electrically connected to the first switching device.

7. The liquid crystal display device of claim 6, wherein each of the
15 sensing part comprises:

a second switching device being turned on in response to the incident light to output a first signal that is applied to the data line;

a third switching device outputting the first signal provided from the second switching device in response to a second signal applied to the gate line; and

20 a first sensor line receiving the first signal from the third switching device and transmitting the first signal to the control part.

8. The liquid crystal display device of claim 7, wherein each of the sensing part further comprises a second sense line.

9. The liquid crystal display device of claim 8, wherein the second switching device includes a second gate electrode diverging from the second sensor line, a second source electrode diverging from the data line, and a second drain electrode being electrically connected to the third switching device.

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10. The liquid crystal display device of claim 7, wherein the third switching device includes a third gate electrode diverging from the gate line, a third source electrode being electrically connected to the second switching device, and a third drain electrode being electrically connected to the first sensor line.

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11. The liquid crystal display device of claim 7, wherein the first switching device, the second switching device and the third switching device correspond to an amorphous-silicon thin film transistor.

15 12. The liquid crystal display device of claim 6, wherein each of the sensing part comprises:

a first sensor line receiving a first signal from the control part;

a second switching device outputting the first signal in response to the light;

20 a third switching device outputting the first signal provided from the second switching device in response to a second signal provided from the gate line; and

a second sensor line providing the control part with the first signal outputted from the third switching device.

25 13. The liquid crystal display device of claim 12, wherein the second switching device includes a second gate electrode diverging from the first sensor line,

a second source electrode electrically connected to the gate electrode, and a second drain electrode electrically connected to the third switching device.

14. The liquid crystal display device of claim 12, wherein the third switching device comprises a third gate electrode diverging from the gate line, a third source electrode electrically connected to the second switching device, and the third drain electrode electrically connected to the second sensor line.

15. The liquid crystal display device of claim 6, wherein the pixel electrode comprises a transparent electrode and a reflective electrode including a transmission portion and a reflection portion, the reflective electrode facing the transparent electrode.

16. The liquid crystal display device of claim 15, wherein the reflective electrode comprises an opening window exposing the sensing part, the incident light passing through the opening window and arriving at the sensing part.

17. The liquid crystal display device of claim 6, wherein the incident light is an infrared light.

18. The liquid crystal display device of claim 17, wherein the sensing part comprises:

a capacitor formed with an electrode line and a pyroelectric thin film, an insulation layer being interposed between the electrode line and the pyroelectric thin film, the capacitor storing a first signal in response to the infrared light;

a second switching device outputting the first signal stored in the capacitor in response to a second signal provided from the gate line; and

a sensor line receiving the first signal from the second switching device and transmitting the first signal to the control part.

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19. The liquid crystal display device of claim 18, wherein the second switching device comprises a second gate electrode diverging from the gate line being provided with the second signal, a second source electrode electrically connected to the pyroelectric thin film and a second drain electrode electrically connected to the sensor line.

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20. The liquid crystal display device of claim 17, wherein the sensor line, the second source electrode and the second drain electrode of the second switching device comprise a transparent and electrically conductive material.

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21. The liquid crystal display device of claim 20, wherein the pixel electrode comprises a transparent electrode and a reflective electrode including a transmission portion and a reflection portion, the reflective electrode facing the transparent electrode.

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22. The liquid crystal display device of claim 21, wherein the reflective electrode comprises an opening window exposing the second switching device, the infrared light passing through the opening window and arriving at the second switching device.

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23. The liquid crystal display device of claim 5, wherein the control part comprises:

a connecting part to receive the analog signal and transform the analog signal into a digital signal in response to a first control signal;

5 a first driving part to drive the liquid crystal display panel in response to a second control signal; and

a second driving part to providing the connecting part with the first control signal and receive the digital signal from the connecting part to output the second control signal.

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24. The liquid crystal display device of claim 23, wherein the first driving part is formed in a chip, the chip being mounted on the liquid crystal display panel, the chip having the connecting part therein.

15 25. The liquid crystal display device of claim 23, wherein the first driving part and the connecting part are integrally formed in the liquid crystal display panel.

26. A liquid crystal display device comprising:

20 a liquid crystal display panel including a plurality of pixels and a plurality of sensing parts, each of the sensing part generating an analog signal containing location information in response to a compression of the liquid crystal display panel, the location information indicating a location on which the liquid crystal display device is compressed, an image being displayed via the pixels; and

25 a control part to receive the analog signal and transform the analog signal into a digital signal, the liquid crystal display device being controlled in response the

digital signal.

27. The liquid crystal display device of claim 26, wherein the liquid crystal display panel comprises:

5 a first substrate including a first switching device, a plurality of pixels and a plurality of sensing parts, each of the pixels having a gate line and a data line, the gate line and the data line being electrically connected to the first switching device;

a second substrate facing the first substrate;

10 a liquid crystal layer interposed between the first substrate and the second substrate; and

a cell gap retaining member disposed between the first substrate and the second substrate, the cell gap retaining member maintains a distance between the first substrate and the second substrate.

15 28. The liquid crystal display device of claim 26, wherein the sensing part comprises:

20 a capacitor formed by an electrode line and a piezoelectric thin film, an insulation layer being interposed between the electrode line and the piezoelectric thin film, the capacitor storing a first signal in response to the compression of the liquid crystal display panel;

a second switching device outputting the first signal stored in the capacitor in response to a second signal provided from the gate line; and

a sensor line receiving the first signal from the second switching device and transmitting the first signal to the control part.

29. The liquid crystal display device of claim 28, wherein the piezoelectric thin film is interposed between the cell gap retaining member and the electrode line.

5 30. The liquid crystal display device of claim 28, wherein the second switching device includes a second gate electrode diverging from the gate line, a second source electrode and a second drain electrode being electrically connected to the sensor line.

10 31. The liquid crystal display device of claim 30, wherein the second source electrode of the second thin film transistor is electrically connected to the piezoelectric thin film.

15 32. The liquid crystal display device of claim 26, wherein the liquid crystal display panel comprises:

a first substrate including an n-number of gate lines and an m-number of data lines, where 'n' and 'm' are natural numbers greater than one;

a second substrate facing the first substrate;

20 a liquid crystal layer interposed between the first substrate and the second substrate; and

a cell gap retaining member interposed between the first substrate and the second substrate, the cell gap retaining member maintaining a distance between the first substrate and the second substrate.

25 33. The liquid crystal display device of claim 32, wherein the sensing

part comprises:

a capacitor including a first electrode and a second electrode, the capacitor storing a first signal in response to the compression of the liquid crystal display panel;

5 a first switching device electrically connected to the first electrode of the capacitor, the first switching device being turned on in response to a second signal provided from i-th gate line to output a second signal, where 'i' is a natural number that is in a range from one to n;

10 a second switching device electrically connected to the first and the second electrode of the capacitor, the second switching device being turned on in response to the first signal to output the second signal; and

a sensor line receiving the second signal from the second switching device, the sensor line transmitting the second signal to the control part.

15 34. The liquid crystal display device of claim 33, wherein the compression is applied to the cell gap retaining member to reduce a distance between the first electrode and the second electrode of the capacitor, so that a capacitance of the capacitor increases.

20 35. The liquid crystal display device of claim 33, wherein the first switching device comprises a first gate electrode diverging from the i-th gate line, a first drain electrode electrically connected to the first gate electrode, and a third source electrode electrically connected to the first electrode of the capacitor.

25 36. The liquid crystal display device of claim 33, wherein the second

switching device comprises a second gate electrode electrically connected to the second electrode with the capacitor, a second source electrode and a second drain electrode, the second signal of the i -th gate line being transferred to the sensor line via the second source electrode and the second drain electrode.

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37. The liquid crystal display device of claim 36, wherein the second gate electrode of the second switching device diverges from an $(i+1)$ -th gate line.

38. A method of manufacturing a liquid crystal display device
10 comprising:

forming a first substrate including a plurality of pixels and a plurality of sensing parts, each of the sensing parts generating an output signal containing location information in response to an input signal, the location information indicating a location where the input signal is inputted;

15 forming a second substrate;

combining the first substrate and the second substrate; and

forming a liquid crystal layer between the first substrate and the second substrate.

20 39. The method of claim 38, wherein the first substrate is formed by:

forming a plurality of pixels and a plurality of sensing parts, each of the pixels including a gate line, a data line and a first switching device, each of the sensing parts including a first sensor line, a second sensor line, a second switching device and a third switching device;

25 forming a transparent electrode being electrically connected to the first

switching device; and

forming a reflective electrode including a transmission portion and a reflection portion, the second switching device being exposed via the transmission portion.

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40. The method of claim 39, wherein the pixels and the sensing parts are formed by:

forming a first conductive pattern including a gate line, a first gate electrode of the first switching device, a third gate electrode of the third switching device, a first
10 sensor line and a second gate electrode of the second switching device, the first gate electrode and the third gate electrode diverging from the gate line, the second gate electrode diverging from the first sensor line;

forming a gate insulation layer on the first conductive pattern;

forming a semiconductor layer on a portion of the gate insulation layer, the
15 portion being disposed near the first gate electrode, the second electrode and the third gate electrode; and

forming a second conductive pattern on the semiconductor layer and the gate insulation layer, the second conductive pattern including the data line, a first source electrode and a first drain electrode of the first switching device, a second
20 source electrode and a second drain electrode of the second switching device, a second sensor line, and a third source electrode and a third drain electrode of the third switching device, the first source electrode and the second source electrode diverging from the data line, the third source electrode diverging from the second sensor line.

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